

## Ecthyma Gangrenosum Occurring at Sites of Iatrogenic Trauma in Pediatric Oncology Patients

O. Murphy, MB, BCh, BAO, MRCPI, P.J. Marsh, BSc, MB, ChB, MRCPPath,  
J. Gray, MB, ChB, MRCP, MRCPPath, S.J. Pedler, MB, ChB, MRCPPath, and  
J. Kernahan, MB, BS, FRCP(Ed) DCH

We report two cases of ecthyma gangrenosum which occurred at sites of iatrogenic trauma. The first case developed due to metastatic seeding with *Pseudomonas aeruginosa* during an episode of septicaemia and the second case occurred as a pri-

mary skin lesion. Both required prolonged courses of antibiotics and one patient died. The different pathogenic mechanisms and outcomes associated with this condition are discussed. © 1996 Wiley-Liss, Inc.

**Key words:** ecthyma gangrenosum, *Pseudomonas aeruginosa*, iatrogenic

### INTRODUCTION

Ecthyma gangrenosum (EG) is a well recognized cutaneous manifestation of *P. aeruginosa* infections in immunocompromised patients [1]. We report two cases of EG occurring at sites of iatrogenic trauma in pediatric oncology patients and demonstrate important pathogenic and clinical features of this condition.

### CASE REPORTS

#### Case 1

A 2-year-old girl with acute lymphoblastic leukaemia was admitted with a fever, 2 weeks after a course of chemotherapy which included intrathecal methotrexate. She was profoundly neutropenic (WCC  $2.2 \times 10^9$  /L, no neutrophils). Physical examination revealed a swollen, erythematous area with a central black eschar over the lumbar puncture site. She was commenced empirically on imipenem-cilastatin and teicoplanin. Following isolation of *P. aeruginosa* from both blood cultures and lesion swab, a diagnosis of EG was made and therapy was changed to ceftazidime and amikacin. Radiological assessment of the lumbar spine did not reveal any evidence of bony involvement. She became afebrile on day 3 as her neutropenia began to recover. She did not require treatment with colony stimulating factors. Antimicrobials were discontinued on day 17. Topical silver sulphadiazine was continued for a further 4 weeks as the lesion healed slowly by granulation from the base.

For subsequent chemotherapy, high dose intravenous methotrexate was substituted for intrathecal methotrex-

ate. No further lesions developed during the remainder of her treatment.

#### Case 2

A 13-month-old girl was admitted for investigation of pancytopenia. A diagnosis of aplastic anaemia was made following left iliac crest marrow aspirate and trephine bone biopsy. She became pyrexial on day 10 following admission but repeated blood cultures were negative. On day 24, a 1 cm<sup>2</sup> sloughing necrotic area surrounded by purplish erythema was noted at the bone marrow sampling site. At this time her Hb was 6.6 g/dl and WCC was  $2.4 \times 10^9$ /L (neutrophils  $0.6 \times 10^9$ /L). She was treated empirically with azlocillin and gentamicin. *P. aeruginosa* was isolated from the lesion swab and a diagnosis of EG was made. Blood cultures remained sterile and radiological examination did not reveal any evidence of bony involvement. Despite prolonged antibiotic and topical therapy, the iliac crest lesion failed to improve. On day 32, she became pyrexial and *Enterobacter* sp. was isolated from two blood cultures. She was treated with intravenous gentamicin and ciprofloxacin. Throughout her illness she required numerous transfusions with platelets and red blood cells. A suitable bone marrow donor could

From the Departments of Microbiology (O.M., P.J.M., J.G., S.J.P.), and Child Health (J.K.), Royal Victoria Infirmary, Newcastle upon Tyne, UK.

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Address reprint requests to O. Murphy, M.B., B.Ch., B.A.O., M.R.C.P.I., Department of Microbiology, Royal Victoria Infirmary, Queen Victoria Road, Newcastle upon Tyne NE1 4LP, UK.

not be found. A 2-week course of GMCSF was started on day 53 but no improvement in her haematological parameters was seen and her general condition continued to deteriorate. On day 85, she again became pyrexial and a  $1.0 \times 1.5$  cm ulcer on her right labium majus was noted. Her WCC was  $0.4 \times 10^9/L$ . *P. aeruginosa* was isolated from blood cultures for the first time. Despite aggressive antibiotic and antifungal treatment, further lesions developed on her face and chest and she subsequently died.

## DISCUSSION

Although not pathognomic, ecthyma gangrenosum is a well recognised manifestation of *P. aeruginosa* infection in immunocompromised patients. Factors such as neutropenia, use of broad spectrum antibiotics, loss of skin integrity, and moist conditions have been shown to predispose to infection with *P. aeruginosa* and the development of EG [2]. Two possible pathogenic mechanisms in the development of this condition have been postulated [2,3]. In classic or bacteraemic EG, the lesion is considered to represent blood-borne metastatic seeding of *P. aeruginosa* to the skin. In non-bacteraemic or primary EG, the lesion is located at the site of entry of the organism into the skin. In these cases the lesions have been found to occur more commonly in the distribution of exocrine glands and secondary bacteraemia has rarely been reported. Early diagnosis and aggressive therapy are important in the management of these patients. Although patients with non-bacteraemic lesions have generally been found to have a better prognosis than those with bacteraemic EG [3,4], our experience of survival ultimately being determined by recovery of neutrophils confirms that of others [5].

To our knowledge, these are the first reports of EG occurring at sites of iatrogenic trauma in paediatric oncology patients. The only previous report was in an adult with AML who developed EG at the site of placement of an ECG electrode [6]. In this case, skin trauma coincided with a documented *P. aeruginosa* septicaemia and metastatic seeding was felt to have occurred.

In case 1, we believe that seeding to an area of traumatised skin occurred during bacteraemia. Early recognition and aggressive treatment may have played a role in controlling the primary septicaemia but recovery of the patient's bone marrow probably contributed more to the long-term outcome. In case 2, repeated negative blood cultures suggest that EG occurred as a primary lesion at a site of prior skin trauma. Despite aggressive treatment, persistent profound neutropenia was associated with failure of the lesion to resolve and the development of a secondary bacteraemia and further lesions.

Paediatric oncology patients are frequently subject to invasive procedures involving minor skin trauma which may predispose them to infection with various organisms including *P. aeruginosa*. EG is an extremely difficult condition to treat and a high index of suspicion in this at-risk population is required to ensure early diagnosis and optimum treatment.

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